

CLAIMS

1. A process for initializing and updating the topology of a high-voltage or medium-voltage electrical power station, the process being intended to optimize the operation of a digital protection system for protecting sets of busbars in the power station and using a basic schematic of the electrical configuration of the power station obtained from information on the type of components used in the power station, and on the possible connections and accesses to said components, said information being provided by an operator from a man-machine interface and assigned to management units of said digital protection system, said management units comprising peripheral measurement units distributed over the power station and at least one centralization unit, the process including the following steps:

- a topological compilation process is implemented to provide a compiled schematic topology from the basic schematic, and to provide a compiled assignment topology of the components in the power station and of their connections to said management units;

- a partial graph is obtained for each peripheral measuring unit from the compiled schematic and assignment topologies and from information collected by said unit on the status of the components which are assigned to it, operational search processes being implemented to generate partial graphs whose structure depends on the type of information searched for and the status of each component of the power station; and

- a complete graph is computed in one or more centralization units by algorithms which superpose partial graphs in accordance with graph theory.

2. A schematic topological compilation and assignment topological compilation process used to implement the topology updating process according to claim 1, the process including the following steps:

- provisionally numbering all the connections of the basic schematic,

- reducing to nodes connections between numbered objects representing the components of the network, by renumbering with the same number all the contiguous connections between objects,

- splitting each object into as many terminal components as there are possible ports for the component that it represents,

- constituting all the connections between objects by establishing the list of all their terminal components in the form of a reduced connections graph,

- dividing the list of terminal components into subsets each consisting of interconnected terminal components,

- assigning each subset of terminal components to a management unit as soon as at least one terminal component of said subset represents a connection concerning a component managed by that unit,

- identifying subsets of terminal components assigned to each peripheral measuring unit as internal nodes or external nodes of said unit, a subset being defined as an internal node if all its terminal components are managed by the unit and as external node if at least one terminal component concerns a component that has not been assigned to the unit,

- for each peripheral measuring unit, constituting reduced external nodes that are purged of objects unknown to the unit and replace the old external nodes identified in the preceding step, and

- identifying the nodes processed by a centralization unit of the protection system.

3. An operational search process used for implementing the topology updating process according to claim 1, wherein the searching process uses information collected by a peripheral measuring unit on the status of the

components which are assigned to it to arrive at a topology in the form of node(s) or in the open graph form between the ports of each object, and wherein a plurality of nodes interconnected in a partial graph are grouped into a single node during a step of node reduction by mutual comparison.

4. An operational search process according to claim 3, wherein the assignment information belonging to the peripheral measuring units is formatted as topology binary files which use strings of one or more bytes, and wherein each bit of a byte represents the port of a component which is identified at the time of the assignment or represents an external node assigned to a said unit.

5. An operational search process according to claim 4, wherein a node of a partial group is described by a binary file in which each bit goes to logic 1 if the port that the bit represents is a port of the node.

6. An operational search process according to claim 5, wherein the nodes of a partial graph are reduced on the basis of binary files describing the basic nodes and the status connections of the graph by applying the AND and OR logic operators to the binary files.

7. An operational search process according to claim 6, wherein a flow graph of the part of the basic schematic assigned to a peripheral measuring unit is established from the distributed basic schematic entered by an operator, and wherein said flow graph is processed by said unit to optimize the number of logic operations that it must perform on the binary files for the node reduction steps.